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ABSTRACT

A study sought to: (1) determine what nontechnical skills were needed at each level on the dual (management/nonmanagement) career ladder labeled "technician" at the host organization; (2) determine the impact of the dual ladder on needs assessment; and (3) use the skills needs assessment process as a pilot study for determining the nontechnical skills needs of other multicareer ladder job classifications. The needs assessment process involved use of the Hersey and Blanchard Changing Skills Model. Typical job descriptions were analyzed, interviews were conducted, and the Nominal Group Technique was used. Twelve employees from the upper ranks of both career ladders participated. Major findings were the following: (1) the size and complexity of the technician career ladders made use of the standard form of the Nominal Group Technique unsatisfactory; (2) participants were often not knowledgeable about the requirements for positions on the technician career ladder that was not their own; and (3) the Hersey and Blanchard model could not be applied because of the varied levels of technical and human skills needed on the nonmanagement ladder. Consequently, some features of the Delphi Technique were incorporated into the Nominal Group Technique and participants generated and ranked the skills needs for only their own ladder. An extension to the Hersey and Blanchard model was proposed. (The document includes a 34-item bibliography.) (CML)

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Study Number Seven

Examination of the Applicability of the Hershey Blanchard Changing Skills Model to Non-technical Skills Curriculum Needs Assessment Process in a Dual Career Ladder Research and Development Organization

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August 1988

Institute

for

Research in Training and Development

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ABSTRACT

Many organizations utilize established "career ladders" built into their organizational/personnel structures. Industrial research organizations commonly use dual track or other multitrack career ladders to provide opportunities for personnel with no interest or ability in management to advance while staying in their technical fields of expertise. The Technician job classification at the host organization was a dual career ladder.

The Education and Training Department at the host organization sought to identify the nontechnical skills and knowledge, those that do not pertain directly to the technical aspects of the job, for all positions on the Technician ladder in order to develop a nontechnical skills curriculum.

The purpose of this study was to identify these nontechnical skills, determine the impact of the dual ladder on the needs assessment process, and assess the methodology for its applicability to other multitrack career ladders at the host organization. A secondary purpose was to determine whether a model by Hersey and Blanchard illustrating the changing skills needs of a management hierarchy could be accurately applied to a career ladder which included nonmanagement positions. This model was listed in Management of Organizational Behavior: Utilizing Human Resources, Prentice-Hall, 1982.

The procedures consisted of: An analysis of typical job descriptions, individual interviews, and application of the Nominal Group Technique. Using these approaches, the Technician ladder was studied as a whole rather than by studying the positions separately. Participants were selected from the upper ranks of both sides of the ladder so that they were authorities on as many positions as possible.

The study found that due to the size and complexity of the Technician ladder, the Nominal Group Technique in its standard form was unsatisfactory, and modifications were necessary during the data gathering sessions. A hybrid procedure combining features of the Nominal Group Technique and the Delphi Technique is proposed to provide adequate time for idea generation and discussion, yet minimizing meeting time.

The study also found, however, that participants from positions on one side of the dual track split were often not complete experts on the skill requirements of positions on the other side of the ladder, which could lead to inaccuracies in group rankings of skills needs. The suggestion is therefore made to split the ladder vertically enabling participants to generate and rank the skills needs only for their own track.

Lastly, the Hersey and Blanchard model of management skills could not be applied accurately to the Technician hierarchy due to the varied levels of technical and human skills needed in the nonmanagement portions of the ladder. An extension to the Hersey and Blanchard model is suggested which would more accurately approximate the skills needs of the nonmanagement portions.

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INTRODUCTION

Many organizations utilize established "career ladders" built into their organizational/personnel structures. These career ladders are formalized steps or levels that employees proceed through as they move up through the organization. Each level requires a different mix of psychomotor and cognitive skills, technical and nontechnical knowledge. Technical skills and knowledge are those that pertain directly to the technical aspects of the job. In a research and development organization these could include knowledge or chemistry or polymer science. Nontechnical skills and knowledge are those that apply indirectly to the particular job, such as communication skills or supervisory skills. Because every job requires at least some interaction with others, nontechnical skills are a factor in any job. Depending on the responsibilities of the job, effective nontechnical skills can be crucial.

Establishing an educational curriculum that would teach the skills necessary for advancement through the ladder would serve employees by helping them plan their career development. Employees need to have opportunities available to them and be able to see these opportunities (Leibowitz, Farren, and Kaye 1986, p. 30). A curriculum of this type would provide them with a sense of possibility. It would also serve the organization by helping to ensure that promoted individuals have the skills necessary for the job.

Most career ladders begin at the entry level of a particular job classification and proceed to a point where the level involves supervisory activities. Employees at this point must decide whether to enter the managerial ranks. Some employees have no interest in management, others would not be good at it (Moore and Davies 1977, p. 14). These employees often move on to other organizations to find promotions and better pay while staying in their field of expertise.

The dual ladder system was developed and implemented in the host organization to provide top quality scientists with continuing opportunities for advancement while remaining in their technical fields of expertise. These positions paralleled managerial positions, offering equivalent levels of responsibility, status, and pay (Moore and Davies 1977, p. 14). Many industrial laboratories now use a dual ladder system to separate managers from technologists (Spear and Souder 1986, p. 25). At the host organization, this dual ladder scheme has been applied to all three major job classifications: Technician (Figure 1), Administrative/Word Processing (Figure 2), and Scientist/Engineer (Figure 3).

The technical knowledge required for each of these job classifications cuts across many technical disciplines, making a Labs-wide technical curriculum for them impractical. However, the nontechnical knowledge for any level of a given classification should be constant across the technical disciplines, making nontechnical curricula feasible.

Staff Technologist	Technology Supervisor
Senior Technologist	Area Supervisor
Technologist	Supervisor
Senior Staff Technician	Project/Process Supervisor
Staff Technician	
Senior Technician	
Technician	
Basic Technician	
Technician Assistant	

Figure 1. Technician Career Ladder

Word Processing Coordinator	Office Support Coordinator
Word Processing Assistant	Administrative Assistant
Word Processing Specialist	Administrative Secretary
Word Processing Secretary	Secretary
Clerk	

Figure 2. Administrative/Word Processing Career Ladder

Vice President			
Corporate Fellow	Technical Director R&D		Operations Director R&D
Senior Fellow	Sr. Technical Consultant	Project Director R&D	
Fellow	Technical Consultant	Technical Manager	Division Manager
Sr. Engineering/ Scientific Associate	Sr. Technical Specialist	Sr. Technical Supervisor	Section Head
Engineering/ Scientific Associate	Technical Specialist	Technical Supervisor	
Staff Engineer/ Scientist	Staff Engineer/ Scientist	Staff Engineer/ Scientist	
Sr. Engineer/ Scientist	Sr. Engineer/ Scientist		
Engineer/ Scientist	Engineer/ Scientist		

Figure 3. Scientist/Engineer Career Ladder

The Education and Training Department at the host organization sought to develop a curriculum of nontechnical cognitive skills for each of these three job classifications.

The objectives of this study were to determine the nontechnical cognitive skills needs of each level on the dual ladder Technician classification, and serve as a pilot study for the other classifications. The results could later be translated into corresponding nontechnical skills education.

The specific research questions for the study were:

1. What are the nontechnical cognitive skills needs on each level of the dual Technician ladder?
2. What impact does the dual ladder segment of the classification have on the needs assessment process?
3. What are the implications for applying the assessment methodology and results to the other classifications, especially the four track Scientist/Engineer classification.

The results of the study would not only prove useful to the host organization in planning its curricula, but also assist other organizations with similar organizational structures and needs.

LITERATURE REVIEW

Training

McGeehee and Thayer define training as "the formal procedures which a company uses to facilitate employees' learning so that their resultant behavior contributes to the attainment of the company's goals and objectives" (1961, p. 3). This definition has a management focus. The contributions of training according to this definition take the form of reduced costs through a reduction of production time; reduced waste and defective products; reduced turnover, accidents, absenteeism, grievances, and complaints. McGeehee and Thayer also contend that training reduces administrative costs by creating "a psychological climate which orients the activities of each employee toward achieving the major goals of the organization" (1961, p. 13).

Reducing the organization's costs increases the potential for its success, thereby benefiting both the organization and the individual employee, but there are more immediate benefits of training to the employee (McGeehee and Thayer 1961, p. 15). The employee learns the responsibilities and procedures of the job within a minimum amount of time, reducing frustration and failure; additional skills and knowledge may be acquired, enhancing the possibility of promotion; and the employee is more likely to sense that the organization is

interested in his welfare, thereby increasing contentedness (1961, pp. 15-17). Thus, training, in the general terms of McGehee and Thayer, benefits both the employee and the organization.

These authors use the term in a rather all inclusive sense, making no reference to when the contributions to the company's goals occur. More recent authors see training as focusing on just the present job, with education focusing on preparing the employee for a future job (Liebowitz, Farren, and Kaye 1986, p. 4; Nadler 1980, pp. 23-25).

Nadler goes on to suggest three reasons for education: Workforce planning; preparing replacements; and career planning, which is the "method by which the organization assists an employee to identify his personal goals as related to the possibility of growth within the organization" (1980, pp. 34-35).

Nadler (1980, pp. 2-3) has also developed a model for viewing training, education, and development as elements within an integrated human resources management system including functions and environments. This systems approach is important in understanding the functions, costs, and benefits for both the employee and the organization, and for recognizing the relationship of training, in the broad sense, with other human resources activities.

Career Development

Essential to effective human resource management is the effort of the organization in achieving a good "fit" between a particular

job's requirements and an employee's abilities. Nadler's model (1980, pp. 2-3) points out that recruitment, selection, placement, appraisal, and promotion are geared, from the organization's point of view, to placing the right employee in the right position. To continue to motivate the employee throughout the employee's career, however, opportunities must be provided for the employee to grow (Cascio and Awad 1981, pp. 279-280).

These opportunities can be provided through effective career development programs. Career development consists of career pathing and career planning (Simonsen 1986, p. 70). Career pathing is the identification and development of a sequence or "ladder" by the organization both to develop employees for advanced positions in the hierarchy, and to provide employees with observable goals (Simonsen 1986, p. 70). Career planning is the process of determining long and short range goals by the individual, often with the assistance of the organization (Simonsen 1986, p. 70).

Dual Career Ladders

The typical career ladder leads up through the hierarchy until a point where the employee must take on supervisory activities. But many employees, especially in technical fields, would rather not move into management (Moore and Davies 1977, p. 14). Technically and scientifically oriented individuals originally move into technical fields in order to work with things rather than people, and maintain the ordered, stable activity that they are comfortable with (Bailyn

1980, p. 31). Those technically oriented individuals who do move into management often find this work dissatisfying, and many leave the organization (Meisel 1977, p. 24). The dual ladder concept was therefore developed to reward top quality scientists who did not want to enter management with money and prestige in the organization (Moore and Davies 1977, p. 14).

The dual ladder concept provides technical positions that parallel the managerial rungs of the ladder in terms of knowledge, experience, and responsibility level, but in a technical field of expertise rather than in management. Employees in equivalent positions receive equivalent compensation and status. Usually the dual portion of the ladder begins at some point midway through the job range depending on when management responsibilities begin, visually forming a Y. However, a ladder may begin with the dual portion, forming two parallel paths. The parallel paths are often not exclusive, i. e., employees can move to the other parallel path and back if they qualify (Kane 1987).

Since its introduction, the dual ladder has been applied to many industrial research organizations (Cantrall et al. 1977, pp. 30-33; Emmons 1977, p. 27; Feuer 1986, pp. 27-34; Meisel 1977, p. 24; Smith and Szabo 1977, p. 20; Spear and Souder 1986, p. 25). Fisher and Gaurnier (1970) have suggested its use in the foodservice industry. While there have been many successes and failures with the dual ladder system (Cantrall et al. 1977, pp. 30-33; Emmons 1987, pp. 27-29), it has endured. In 1986 Spear and Souder reported on the

expansion of the dual ladder used at Alcoa Laboratories for the Scientist/Engineer job classification to a quad ladder, this is, four parallel paths.

Obviously, the different positions on any given career ladder demand different tasks and responsibilities, which therefore require different skills and knowledge. Hersey and Blanchard (1982, pp. 5-6) have developed a model which illustrates the changing skills needed at three management levels in the organizational hierarchy.

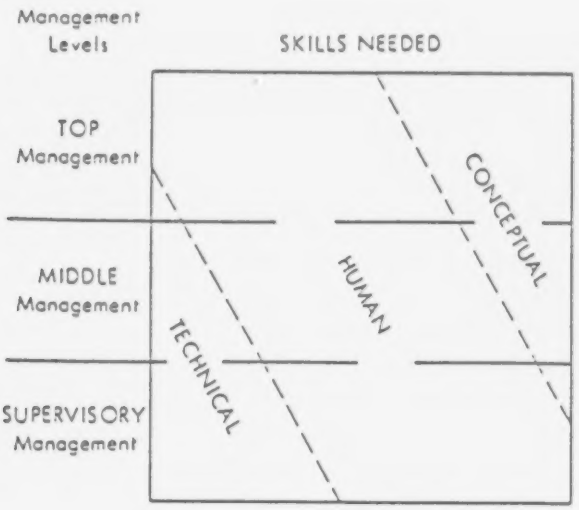

Figure 4. Hersey and Blanchard Model Depicting the Management Skills Needed on an Organizational Hierarchy (Hersey and Blanchard 1982, p. 6).

The model utilizes three types of skills necessary for managerial work: Technical, human, and conceptual skills. Technical skills they define as the "ability to use knowledge, methods, techniques, and equipment necessary for the performance of specific

tasks acquired from experience, education, and training" (Hersey and Blanchard 1982, p. 5). They define human skills as "ability and judgement in working with and through people, including an understanding of motivation and an application of effective leadership" (p. 5). Conceptual skills they define as the "ability to understand the complexities of the overall organization and where one's own operation fits into the organization" (p. 5).

According to the model, at the Supervisory Management level, technical and human skills are primarily required, with very little need for conceptual skills. At the Middle Management/Supervisor level, the need for technical skills decreases while the need for conceptual skills increases. At the Top Management level the need for technical skills is quite low while the need for conceptual skills increases substantially. The need for human skills remains nearly constant throughout the levels (Hersey and Blanchard 1982, p. 5).

Whether this model can be applied to a hierarchy that includes nonmanagement positions is unclear. If so, then the model can be used to project the relative skill breakdown of most ladders.

The four stages of career development theorized by Dalton, Thompson, and Price (1977, p. 23) provide another way of looking at the changing skills and knowledge required as one moves through a career. The first stage of development, which they call Apprentice, is the novice stage in which the employee learns and follows directions. At stage 2, the Independent Contributor stage, the employee is expert, capable of doing the job and making decisions. By stage 3, the Mentor stage, the employee is responsible for others

through supervisory duties, and making decisions and accomplishing tasks through others. At stage 4, called the Sponsor stage, the employee is responsible for planning and directing the course of the entire organization; this is the senior executive stage. While a career ladder may not include all four of these stages, it will include at least several.

At stages 1 and 2 the emphasis is on learning and doing the job. In a technical field the emphasis is on the technical aspects of the work. At stages 3 and 4 the emphasis is on management activities. The categories of skills and knowledge required at these stages change, ranging from more technical requirements at the beginning stages, to more supervisory and interpersonal skills at the later stages.

Needs Assessment

The effective use of training and education first requires a careful assessment of the organization's needs (McGeehee and Thayer 1961, p. 24). All too often training solutions are planned and implemented before the real problems and their causes are defined (Harless 1970, p. 1).

Kaufman and English define needs assessment as "a formal process which determines the gaps between current outputs or outcomes and required or desired outcomes or outputs; places these gaps in priority order; and selects the most important for resolution" (1979, p. 8).

Laird (1978, p. 47) suggests viewing training needs as either "micro" or "macro" needs. Macro needs exist for a large work group such as a division or job classification when a major organizational policy change takes place. Micro needs exist for an individual or small group.

McGeehee and Thayer (1961, pp. 25-26) advocate a three-phase approach to determining training needs:

1. Organizational analysis - determining where training emphasis can and should be placed through analysis of the organization's objectives and resources.
2. Operations analysis - determining the required content through analysis of the required tasks and activities of a job or assignment.
3. Man analysis - determining the skills, knowledge, and attitudes that a particular employee must develop to perform the task or job through analysis of that employee's strengths and weaknesses.

Kaufman and English (1979, pp. 65-73) differentiate between internal and external needs assessments. Internal assessments are done from within the organization while external assessments are done from without. Internal assessments imply some connection with the organization and lead to assumptions that goals and objectives of the organization are valid. These assumptions often lead to ignoring organizational or management issues as potential problem causes. External assessments make no assumptions about the organization, its problems or needs, and are therefore the better place to start when

possible. Internal assessments, however, are the more common of the two simply because they are usually conducted by internal personnel.

Leach (1979, p. 68) points out that to be effective, assessments must distinguish between needs and wants, they must take organizational objectives into account, and they must not assume that all needs can be met through training.

The suggested methods of needs assessment vary among authors, though all are grounded on several basic approaches. Leibowitz, Farren, and Kaye (1986, p. 23) provide four suggested methods for needs assessment: Questionnaires; one-on-one interviews; group interviews; and records, reports, and related surveys. Swanson and Gradous (1986, p. 198) group the two interview methods together and add observations as another valuable method. Instruments and tests are added to the list by Zemke (1985, p. 18), instruments defined as researched, tested, and validated questionnaires commercially available from psychological and educational sources.

Kirkpatrick (1971, pp. 24-29) lists exit interviews, performance reviews, attitude surveys, and job analyses separately on his list of eight ways of determining needs. Ulschak (1983, p. 74) points out, however, that records and reports from the organization must be available to the researcher or they are of no value. Ulschak (1983, pp. 67-93) also identifies print media, including professional journals and periodicals, and workshops and seminars as other useful resources, along with key consultations with knowledgeable persons or committees in the organization. Leibowitz, Farren, and Kaye (1986, p.

24) recommend using curriculum advisory groups to provide additional data material and to promote acceptance and involvement.

Several authors suggest using more than one method whenever possible (Steadham 1980, p. 59; Ulschak 1983, p. 93). Steadham (1980, p. 59) also advises not spending so much time and energy on assessment that nothing is left for designing and implementing the training program, and designing surveys and interview questions in such a way that respondents have some freedom to respond.

Several more advanced approaches, which blend many of the basic techniques, also exist. These include the Critical Incident and Delphi techniques, and the Nominal Group Technique, or NGT.

The Critical Incident approach identifies behaviors critical to the performance of an activity through observations, interviews, questionnaires, or organizational records (Johnson 1983, pp. 133-151). Critical incidents are identified and described as they relate to the effective performance of the activity.

Another technique is the Delphi Technique, an iterative questionnaire approach in which responses by participants to a question are analyzed and summarized, then fed back to the participants who respond again. Several rounds of this activity leads to a distillation of opinions and ideas (Rath and Stoyanoff 1983, pp. 111-129).

The Nominal Group Technique, developed by Delbecq and Van de Ven is a structured group approach that capitalizes on the creative interaction of group meetings while minimizing the negative aspects of group dynamics (Delbecq, Van de Ven, and Gustafson 1975, pp. 7-10).

The technique involves four steps:

1. The silent, individual generation of ideas in writing.
2. The statement of ideas by individuals in round-robin fashion which are then recorded on a flipchart.
3. Clarification and discussion of the ideas.
4. Prioritizing the ideas by numerical weighting or ranking.

Groups of individuals have been found to brainstorm a much larger number of ideas than independent individuals (Hall, Mouton, and Blake 1963). In addition, individuals in groups can share expertise resulting in a larger cumulative knowledge base (Delbecq, Van de Ven, and Gustafson 1975, p. 6). However, interactive group meetings have several disadvantages. Individuals with low status may feel inhibited and may acquiesce to the opinions of individuals with high status (Torrance 1957). Individuals may also feel inhibited by others with dominant personalities (Chung and Ferris 1971).

Van de Ven (1974) conducted a study which compared the interactive meeting, Nominal Group, and Delphi techniques. He found that these effects were minimized using the Delphi Technique due to the lack of face-to-face interaction. The effects were also minimized using the Nominal Group Technique because the silent generation of ideas and presentation of those ideas before discussion reduced the fear of criticism and therefore reduced the inhibition of ideas. Van de Ven (1974) also found that the NGT groups generated more ideas than the Delphi groups and nearly twice as many ideas as interacting groups.

This same study compared the utilization of resources by the three techniques (Van de Ven 1974). Administrative time and effort was found to be nearly equal for the interactive group and Nominal Group techniques, but substantially higher for the Delphi Technique. Administrative costs for the Delphi Technique were found to be approximately twice that of both the interactive group and Nominal Group techniques. The amount of calendar time required to conduct the techniques was found to be several days for both the interactive group and Nominal Group techniques, compared with several months to conduct the Delphi Technique. Only in participant time did the Delphi Technique require fewer resources, demanding less than half the number of participant hours than both the interactive group and Nominal Group techniques. Thus the Nominal Group Technique was found to have many advantages over the interactive group meeting, and over the Delphi Technique except in situations where participant time was the highest priority.

Method Selection

The selection of appropriate methods is important to the effectiveness of any needs assessment. Steadham (1980, pp. 56-61) suggests the following criteria to consider in selection:

1. Resources required and available
2. Degree of consultant/client involvement in design and implementation
3. Health of the organization

4. Persons who will be involved
5. Methods preferred by the decision-makers
6. Plans for use of the results
7. Extent to which the needs are already known
8. Time lag between the data collection and action
9. Degree of reliability and validity necessary
10. Confidentiality/anonymity
11. Relation of consultant to client
12. Consultant's preferred method

Newstrom and Lillyquist (1979, pp. 54-55) suggest a much more abbreviated list of criteria for differentiating methods:

1. Employee involvement
2. Management involvement
3. Time required
4. Cost
5. Relevance and quantifiability
6. Any other organization/situation specific criteria

Laird (1978, p. 58) further reduces the list to four criterion:

1. Cost effectiveness
2. Legal requirements
3. Executive pressure
4. Population to be served (many people or a few key people)

All three lists provide important criterion. The lists of Steadham and Newstrom and Lillyquist focus primarily on the issues directly related to the needs assessment, such as time, cost, and persons to be involved. Laird's list identifies issues which are

indirectly related to the selection of needs assessment methods yet can profoundly affect it, such legal and internal political issues. As Ulschak (1983, p. 22) points out, management support is essential for any needs assessment to be of any value. Without management support, those conducting the assessment will have insufficient power to take action on the results. Environmental issues within the organization, therefore, must be considered.

The priority of the criteria on the lists is dependent on the objectives of the assessment and the conditions that must be met (Ulschak 1983, pp. 44-45). This identifies what the assessment should accomplish, and puts it into the proper environmental context. Method selection is then a matter of weighing the advantages and disadvantages of each method against the objectives of the assessment in light of the identified criteria (Ulschak 1983, p. 56). According to Steadham (1980, pp. 56-61), the actual selection process is still more artistic than scientific.

Summary

Career ladders provide observable opportunities to employees, improving motivation. Dual ladders provide alternative goals to employees with no interest or aptitude for management. Education can provide employees with the skills and knowledge necessary to move into new positions, assisting employees in their career planning efforts, and benefitting the organization by providing individuals suitable for promotion.

Determining the skills and knowledge that should be developed can only be done through an effective needs assessment program. There are many methods to choose from, including many basic techniques and several more advanced techniques which combine the basic methods. Of these more advanced techniques, the Nominal Group Technique provides an effective compromise of elements. It combines many of the productive benefits of interactive group meetings, while minimizing the negative aspects caused by status and personality differences. Compared to the Delphi Technique, the Nominal Group Technique yields substantial savings in cost, effort, and especially calendar time.

The models of Hersey and Blanchard, and Dalton, Thompson, and Price provide a starting point for understanding the changes in skills and knowledge required throughout the range of a career ladder. Both models suggest that as one progresses up a career ladder fewer technical skills and more nontechnical skills are required. Hersey's and Blanchard's model, however, is based on a managerial hierarchy. It is uncertain whether the model can be accurately applied to career ladders which include nonmanagerial job levels. The ability to apply the model to any career ladder would enhance efforts to develop a career development curriculum for that ladder.

PROCEDURES

The research questions for the study were:

1. What are the nontechnical cognitive skills needs on each level of the dual Technician ladder?
2. What impact does the dual ladder segment of the classification have on the needs assessment process?
3. What are the implications for applying the assessment methodology and results to the other classifications, especially the four track Scientist/Engineer classification?

In addition, Hersey's and Blanchard's model of management skills needed on an organizational hierarchy, mentioned in the literature review, gave rise to a fourth question:

4. Is Hersey's and Blanchard's model valid when applied to an organizational hierarchy that includes nonmanagement positions?

The first of these questions provided data of specific interest to the host organization for the development of a curriculum of nontechnical skills for the Technician job classification, and would provide data for answering the final three questions. The final three questions provided information generalizable to other situations and organizations.

Methods

The procedures for answering these questions consisted of three methods:

1. Analysis of typical job descriptions.
2. The Nominal Group Technique.
3. Individual interviews.

Answering the fourth question required a secondary analysis of the results of these methods.

While there were many jobs, and therefore many job descriptions for each position on the Technician ladder at Alcoa Laboratories, only one representative job description for each position was available to the researchers. Each of these job descriptions were analyzed for nontechnical skill requirements. Duty statements that required nontechnical skills or knowledge were identified and assembled into a new list. This list provided representative formal nontechnical skill requirements by the organizations, and served as one basis of comparison.

Initial interviews were conducted with the manager of the Education and Training Department, the supervisor of the Human Resources Department, and another member of the Education and Training Department who coordinates the Technician training activities. These interviews indicated that due to the interrelatedness of the positions, the job levels on the Technician ladder must be viewed in total, rather than isolating the individual levels for study. Also, because different jobs at the same level demand different responsi-

bilities and therefore require slightly different nontechnical skills, the methods had to keep a Labs-wide perspective. Participant involvement was an important factor. Because of the heavy workload in the facilities, the number of participants and the time required of them needed to be kept to a minimum. Calendar time also had to be kept to a minimum. One last consideration was that response rates to surveys mailed within the facilities were historically low.

As a result, the Nominal Group Technique was selected because of its ability to generate a large number of ideas, provide positive group interaction, and minimize calendar time. Because of its structure, NGT also offered the potential of minimal meeting time over standard interactive group meetings. The Delphi Technique was avoided because of it's extensive calendar time requirements, and its reliance on high response rates to mailed questionnaires.

Participant Selection

Due to the need to keep the number of participants small, a list of potential participants was obtained through purposive or judgmental sampling. Due to the need for studying the Technician ladder as a whole, it was important that individuals were chosen who had experienced most of the Technician levels and currently supervised or regularly interacted which employees in most of the levels. This meant that high ranking technicians from the supervisor and technologist tracks of the ladder were preferred. Perspective participants were also selected to represent, as much as possible, a

cross section of the divisions and therefore the different work activities at the Laboratories. Finally, the four Technician Curriculum Committees were to be represented, if possible. These curriculum committees are ongoing key advisory groups to the Education and Training Department. The four Technician Curriculum Committees represent four content disciplines pertinent to the host organization.

The supervisor of the Human Resources Department provided a list of ten people who largely met these criteria. This list was then reviewed by the manager of the Education and Training Department and the coordinator of Technician training.

Letters were sent to those on the list requesting their involvement, and to their division managers requesting their availability. A commitment was made in these letters to limit the participants' involvement to two 90 minute meetings. Both meetings were then scheduled. One-on-one interviews were arranged with those who were unable to attend the NGT sessions.

The supervisor of Human Resources and the coordinator of Technician training were again interviewed to get their input on the nontechnical skills for each Technician position. Since both are extremely knowledgeable about Technician job responsibilities, this input served as additional basis for comparison. These interviews also served to pretest the NGT question. Because of their rapport with the technicians, these two individuals were invited to attend the NGT sessions. There attendance provided additional credibility to the project and the researcher.

The question asked was, "At each position on the Technician ladder, what should someone in that job know or be able to do for the effective performance of the job?" The ladder itself formed the structure of the interviews. The question was applied to each position on the ladder and the comments recorded. After the listing was complete, the skills or knowledge identified within each job position were ranked according to their need for development. This was the pattern for all subsequent interviews.

NGT Procedures

The Nominal Group Technique typically involves four steps:

1. The silent, individual generation of ideas in writing on a blank sheet of paper.
2. The statement of ideas by individuals in round-robin fashion which are then recorded on a flipchart.
3. Clarification and discussion of each of the ideas.
4. Prioritizing the ideas by numerical weighting of ranking.

Studying the entire ladder at one, however, required several modifications.

A form was developed to assist the participants in recording their ideas. This form listed the question mentioned above, then provided each job position on the Technician ladder with spaces under each position. A copy of the complete career ladder was also clipped to the form to provide the participants with a ready reference.

The first NGT session began with a brief introduction explaining the purpose of the project and outlining the agenda for the two meetings. Then the question was explained, and the instructions for responding were given. Participants were given 25 minutes to list their ideas (compared with the typical 5 to 10 minutes). Afterward, the ideas were listed, in round-robin fashion, on the flipchart.

The volume of information, however, made this technique too tedious and time consuming, and the first meeting ended with only about one half of the ideas listed. A suggestion was made to assemble all the ideas before the second meeting to maximize discussion time. This idea was approved by the entire group.

A second form was developed which consolidated all of the ideas from the individual forms retaining most of the actual working. It was obvious that the ranking of the ideas could not be accomplished during the second meeting, so the form also included instructions for ranking the ideas according to need for development, and included spaces for these rankings.

Again, due to the volume of ideas, discussion of each idea was impossible in 90 minutes, so the second meeting was spent clarifying those ideas that were confusing. At the end of the second meeting the participants were asked to rank the items in each job position from 1 to 5, 1 being the item most in need of development, then return the form.

The rankings from the NGT sessions were consolidated, and means and standard deviations used to determine the group rankings of the items. These group rankings were then compared with rankings from the

individual interviews and the distillation of the job descriptions. This process yielded a summary list of skills generally ranked according to their need for development.

Analysis for Comparison with Hersey and Blanchard Model

To determine the applicability of the Hersey and Blanchard model to the host organization's Technician Career Ladder, the skills on the summary list were analyzed according to Hersey's and Blanchard's definitions of the three types of skills, technical, human, and conceptual, as reported in chapter II. Each skill was compared with the definitions and coded with a T, H, or C.

These skills, however, only account for nontechnical skills since technical skills, using the host organization's Education and Training Department definition, were excluded from the study. The coded list was therefore analyzed along with the interviews and the job descriptions which contained generalizations about levels of technical skills needs. This combined information was used to approximate the total skills breakdown for each of the tracks on the Technician ladder.

RESULTS

The results of this study is organized by the four research questions.

Technician Nontechnical Skills

The first research question asked, "What are the nontechnical cognitive skills needs on each level of the dual Technician ladder?"

Table 1 presents the summary list of skills generally ranked according to their need for development from greatest to least. These groups of skills are not mutually exclusive. Unless specifically mentioned in a later group, skills from earlier positions are assumed in the later positions, i. e., employees from the later positions are assumed to have the skills of the earlier positions.

Many of the participants organized the ladder into groups of job positions that they felt require similar skills, although higher positions in each group demand more advanced levels of the skills. The first level in the group was usually considered a key position (except in the case of the first group). This often showed up in the identification of a larger number of required skills for the key positions compared to the other positions in the groups. The positions were typically grouped as in Figure 5.

Table 1. Technician Nontechnical Skills

Technician Assistant

1. Interacting well with coworkers and supervisors (including maintaining good male/female relations)
2. Basic literacy skills (reading, writing, math)
3. Listening skills
4. Clear interpersonal communication
5. Preparing notebook entries detailing day's activities
6. Interpreting job description and translating performance review into improvement
7. Observing safe working habits

Basic Technician

1. Observing safe working habits
2. Basic grammar and writing skills (organizing and writing simple reports)
3. Basic computer literacy
4. Fundamentals of problem solving
5. Record keeping
6. Personal planning
7. Clear interpersonal communication

Technician

1. Communicating observations orally
2. Basic problem solving
3. Record keeping (organizing data and records on permanent data sheets in addition to daily lab notebook)
4. Basic report writing (organizing and writing basic reports outlining procedures used and results obtained)
5. Effective listening skills
6. Time management (organizing and prioritizing)
7. Observing safe working habits

Senior Technician

1. Logic/reasoning skills
2. Basic data interpretation
3. Basic report/letter writing
4. Outlining, brainstorming, prioritizing
5. Interpersonal communication skills (informal oral presentation)
6. Basic technical writing
7. Observing safe working habits

(cont. on next page)

Table 1 (cont.)

Staff Technician

1. Recognizing people problems (empathy)
2. Assertiveness
3. Decision making
4. Interpersonal skills (handling personality and situation differences)
5. Problem solving
6. Intermediate data analysis
7. Basic business skills
8. Promoting and observing safe working habits

(Beginning of the Supervisor track)

Project/Process Supervisor

1. Interpersonal relations, dealing with other experts
2. Report writing/basic business correspondence
3. Management skills
   - Management by objectives
   - Project management (including operating and capital budgets)
   - Goal and objective setting
4. Leadership/motivational skills
5. Strategies for creating and maintaining effective minority relationships (including male/female relationships)
6. Promoting safety awareness

Supervisor

1. Performance review skills
2. Supervisory skills (motivating, coaching, delegating, managing conflict, career development)
3. Knowledge of host organization salary plans
4. Knowledge of the fundamentals of host organization job descriptions and evaluations
5. Planning and scheduling
6. Understanding of host organization management styles and philosophies
7. Advanced oral and written communication skills (status reports, cover letters)
8. EEO laws
9. Providing a safe workplace and promoting safe working habits

(cont. on next page)

Table 1 (cont.)

Area Supervisor

1. Advanced leadership skills
2. In-depth understanding of the host organization system (administration, policy, Labs mission and objectives, strategic direction as applied to Research and Development)
3. Establishing a safe working area and helping to implement safety programs

Technology Supervisor

1. Technical writing
2. Advanced project management skills
3. Formal oral presentation skills
4. Consultation skills
5. Establishing a safe working area and helping to implement safety programs

---

(Beginning of the Technologist Track)

Senior Staff Technician

1. Goal and objective setting
2. Planning and scheduling
3. Interpreting/analyzing data
4. Strategies for creating and maintaining effective minority relationships (including male/female relationships)
5. Interpersonal skills
6. Leadership skills
7. Technical writing skills
8. Formal oral presentation skills
9. Time management
10. Promoting safe working habits

Technologist

1. Project management
2. Technical writing
3. Time management
4. Creativity
5. Advanced problem solving skills
6. Advanced logic/reasoning skills
7. Leadership skills (motivating, coaching, influencing, delegating)
8. Assisting in establishing a safe working environment and implementing safety programs

(cont. on next page)

Table 1 (cont.)

Senior Technologist

1. Expert analysis/consulting skills
2. Project development (initiation/identification)
3. Understanding of the host organization's mission and objectives
4. Understanding of the corporate philosophy that drives Research and Development
5. In-depth understanding of the host organization system (administration, policy, business operation)
6. EEO laws
7. Helping to provide a safe working environment

Staff Technologist

1. Project management
2. Innovation
3. Effective people management
4. Train/teach/coach
5. Budget management
6. Promoting a safe working environment

Staff Technologist	Technology Supervisor
Senior Technologist	Area Supervisor
Technologist	Supervisor
Senior Staff Technician	Project/Process Supervisor
Staff Technician	
Senior Technician	
Technician	
Basic Technician	
Technician Assistant	

Figure 5. Technician Career Positions Grouped by Nontechnical Skill Requirements

Impact of the Dual Ladder on the Needs Assessment

The second research question asked, "What impact does the dual ladder segment of the classification have on the needs assessment process?"

Studying the ladder as a whole required that participants had knowledge of the skills requirements of as many job levels as possible. Ideally, participants were knowledgeable of all levels on the ladder. In those cases where participants were selected from positions lower on the ladder, knowledge of the skills needs of the high level positions was incomplete, thereby affecting the accuracy of responses and rankings.

The dual ladder required that participants also were authorities on the skills requirements of job positions on the opposite track of the dual portion of the ladder, i. e., supervisors were authorities on the skills requirements of the technologist positions and vice versa. Rarely was this the case, although supervisors were more generally knowledgeable of the entire ladder than were technologists, due to their frequent interaction with it. Even with a reasonably equal division of supervisors and technologists, incomplete knowledge of the opposite track's skills may have led to inaccuracies in the rankings of the skills.

Studying all positions of the dual ladder at once also required a tremendous amount of information to be generated and discussed, which demanded more time than available. As a result, clarification and discussion of the generated ideas were abbreviated.

Applicability of Methodology to Other Classifications

The third research question asked, "What are the implications for applying the assessment methodology and results to the other classifications, especially the four track Scientific/Engineering classification?"

Lack of complete knowledge of the required skills of one track by participants from the opposite track suggests studying the tracks of a dual ladder separately, except in cases where the ladder is simple and/or there is a high degree of crossover from one track to the other. The tracks of the other multitrack ladders, especially the highly complex Scientist/Engineer ladder, should be separated and authorities on each track selected and grouped to generate and rank the skills needs only of their track and those portions of the ladder common to all tracks. This would increase the reliability of responses. Results would then be combined and compared.

While yielding adequate results, the Nominal Group Technique, even the modified approach that was used, proved rather unsuitable in this situation. Too much information was requested to be adequately listed, discussed, and voted on in the meeting time available. A

better approach would be to combine aspects of the Nominal Group Technique and the Delphi Technique into the following hybrid and apply it to the separated tracks as mentioned above.

1. Generate a form for each track listing the question and then each position of each track of the appropriate ladder, including any positions common to all tracks. Include spaces for responses beneath each position.
2. For each track, conduct a short initial meeting to introduce the project and its objectives, and explain the form and its instructions.
3. Participants list their responses to the question on the appropriate form and return it through the mail.
4. For each track, combine the responses on a new form using the original wording.
5. Conduct a meeting (or series of meetings) for each track to clarify and discuss the responses on the combined list. Record the changes or deletions.
6. For each track, combine all the clarified skills onto one new form, along with spaces beside each skill and instructions for ranking them. Send the form to the participants.
7. Participants rank the ideas and return the form.
8. Combine the responses from all tracks, then analyze the results and compare them with the analysis of representative job descriptions.

9. Compare these results with results of interviews with appropriate management and staff personnel.

This procedure would still provide the benefits of the individual generation of ideas phase of the NGT, along with the opportunity to clarify and discuss the ideas and rank them. The modifications, however, would provide adequate time for participants to respond, and increase the efficiency of the meeting time. Meetings would focus on clarification and discussion of the nontechnical skills identified. The obvious handicap of this approach is the reliance on participants returning the forms on time. This handicap, though, can be minimized by creating a sense of involvement and importance in small introductory meetings.

Applicability of Hersey and Blanchard Model

The fourth research question asked, "Is Hersey's and Blanchard's model valid when applied to an organizational hierarchy that includes nonmanagement positions?"

The results from the Technician Nontechnical Skills List and other information from the interviews and job descriptions were compared with the definitions of Hersey's and Blanchard's three types of management skills: Technical, human, and conceptual.

For the purposes of identifying the nontechnical skills of the Technician ladder, technical skills according to the host organization's Education and Training Department definition, had been excluded from the study. As a result, no technical skills were

expected to be found in the resulting summary list. However, Hersey's and Blanchard's definition of technical skills is broader, so several skills fell into their technical category. These technical skills identified in the summary list, along with general levels of technical skill requirements obtained from the interviews and job descriptions, were considered in this analysis.

At the entry Technician levels more interaction takes place with things than people. As a result, the technical skills needs are high, the human skills needs are moderately low, and the conceptual skills needs are nonexistent.

Through the next several positions up to the point where the ladder splits, technical skills needs continue to dominate. Human skills needs increase substantially and conceptual skills needs continue to be nonexistent.

Through the positions on the supervisor side of the dual portion of the ladder, technical skills needs drop off, human skills needs increase quickly to a high level, and conceptual skills increase quickly to a moderate level.

Through the positions on the technologist side of the ladder, technical skills needs remain high throughout, human skills needs increase quickly to a high level, and conceptual skills needs remain low or nonexistent at the two lower positions then increase at the two highest positions to a moderate high level.

Using the same format of illustration used by Hersey and Blanchard for comparison, these results are depicted graphically in

Figures 6 and 7. Figure 6 shows the technologist side of the ladder and Figure 7 shows the supervisor side of the ladder. Both figures duplicate the common lower portions of the ladder.

These results indicate that the general pattern of changes in skills needs on the host organization's Technician ladder is somewhat similar to

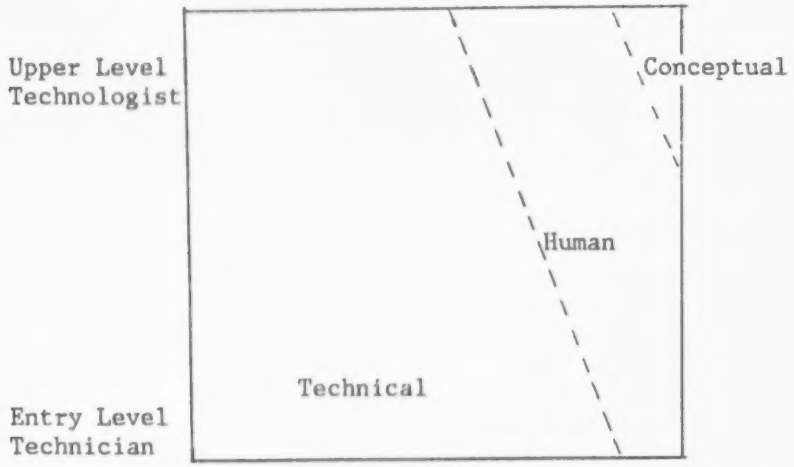

Figure 6. Model Depicting the Skills Needed Through the Technologist Track of the Technician Ladder

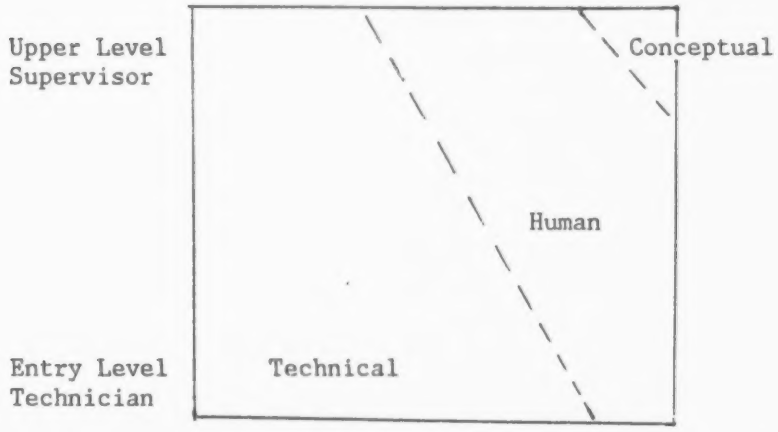

Figure 7. Model Depicting the Skills Needed Through the Supervisor Track of the Technician Ladder

that of the management hierarchy reported by Hersey and Blanchard. Technical skills needs are high early in the hierarchy and conceptual skills needs increase at the latest portions of the hierarchy.

However, the degree of need for the three categories of skills varies substantially from the Technician ladder to the Hersey and Blanchard model. Higher levels of technical skills seem to be required throughout the Technician ladder. Also, human skills increase slightly through the Technician hierarchy rather than remaining consistent as depicted in the Hersey and Blanchard model. Lastly, conceptual skills needs do not appear until much later in the Technician hierarchy.

Rather than the entire Hersey and Blanchard model representing the entire Technician ladder, it appears as though the lower third of the model, that portion associated with supervisory management, approximates the upper portion of the Technician ladder. (There is some deviation in the relative levels of technical and human skills when applying the model to the Technician technologist track.) The Hersey/Blanchard model would therefore need to be extended to account for the lower portion of the Technician ladder as in Figure 8.

It must again be pointed out, however, that this study was based on the nontechnical skills of the Technician job classification, and that accurate levels of required technical skills relative to nontechnical skills were not obtained. These determinations are therefore approximations based on general information gathered from the interviews and job descriptions.

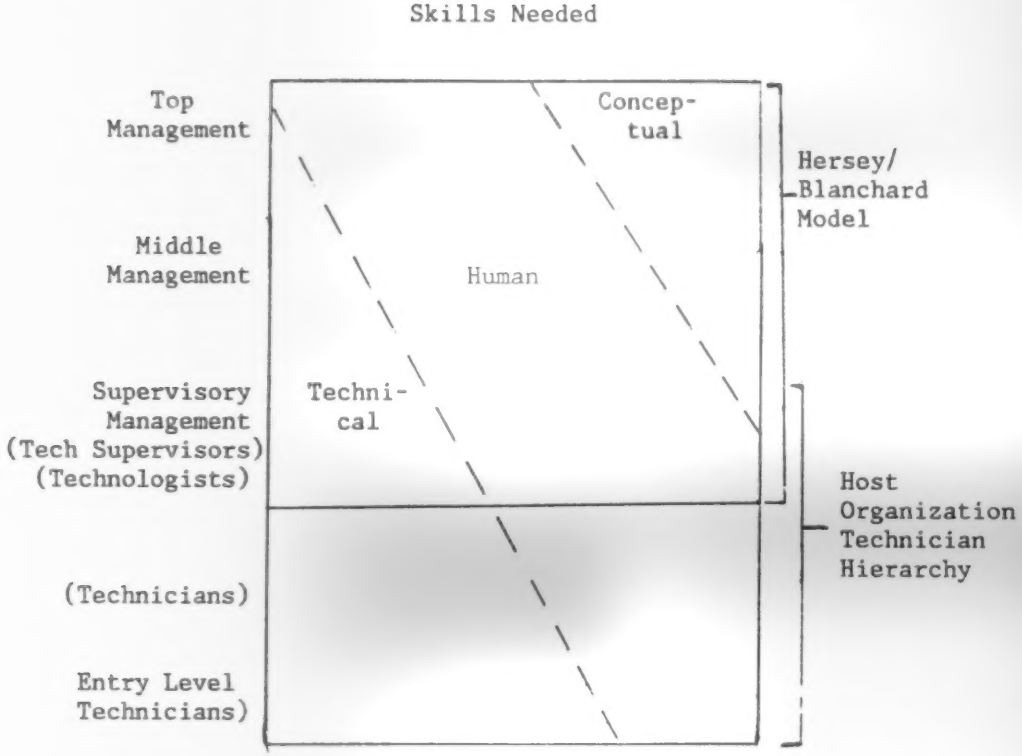

Figure 8. Extended Hersey/Blanchard Model

SUMMARY AND CONCLUSIONS

The objectives of this study were to determine the nontechnical skills needs of each level on the dual ladder Technician job classification at the host organization, and serve as a pilot study for determining the nontechnical skills needs of the other multitrack job classifications.

The results of the study suggest that multitrack career ladders should be separated vertically before investigating the skills needs. Common positions should be included in both the separated tracks. Authorities on the skills needs of one track would provide information only on that track. Results should then be combined for final analysis. This procedure would yield more reliable results.

The results also suggest that the size and complexity of dual or multitrack ladders render the Nominal Group Technique inadequate in its standard form. A proposed solution is to combine some of its features with those of the Delphi Technique to increase the productiveness of the meeting time and compensate for the much larger amounts of information that must be generated and discussed.

Finally, the results suggest that the general pattern of the Hersey and Blanchard model is, in a very broad sense, similar to changes in skills needs of career ladders that include nonmanagement positions. However, the degree of need for each of the three skill categories in the model varies adequately that the model cannot

in its present form. Instead, the model should be
for the higher technical and human skills needs of
the nonmanagement portions of a hierarchy.

In terms of a dual ladder, the study indicates that the technical side of a dual ladder retains the need for technical skills throughout the ladder and requires conceptual skills only at the highest levels, deviating slightly from the lower portion of the
ard model. The supervisor side of the ladder, on the other hand, requires conceptual skills earlier and generally follows the pattern of the lower portion of the Hersey and Blanchard model more closely.

Of course, further study in this area needs to be done: Other multitrack ladders need to be studied to identify the effects they have on the needs assessment process; the suggested hybrid procedure
the Nominal Group Technique and the Delphi Technique must be
ine its validity; and, accurate relative levels of
and conceptual skills need to be identified for a
hierarchies that include both management and nonmanagement positions
the suggested extension of the Hersey and Blanchard model.

Nevertheless, the results provide insights into needs assessment activities in a dual career ladder setting which should prove valuable in curriculum development, career development, and other human resource applications.

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Appendix A

SAMPLE DATA COLLECTION FORMS

TECHNICIAN NONTECHNICAL SKILLS ASSESSMENT

Instructions: Please respond to the following question.

At each position on the Technician ladder, what should someone in that job know or be able to do for the effective performance of the job?

TECHNICIAN ASSISTANT

_____

_____

_____

_____

_____

BASIC TECHNICIAN

_____

_____

_____

_____

_____

TECHNICIAN

_____

_____

_____

_____

_____

Figure 9. Skills Response Form

(cont. on next page)

SENIOR TECHNICIAN

STAFF TECHNICIAN

PROJECT/PROCESS SUPERVISOR

SUPERVISOR

Figure 9 (cont.)

(cont. on next page)

AREA SUPERVISOR

TECHNOLOGY SUPERVISOR

SENIOR STAFF TECHNICIAN

TECHNOLOGIST

Figure 9 (cont.)

(cont. on next page)

SENIOR TECHNOLOGIST

STAFF TECHNOLOGIST

Figure 9 (cont.)

TECHNICIAN NONTECHNICAL SKILLS RANKING LIST

Instructions: For each job position, rank the five skill you feel are MOST IN NEED OF IMPROVEMENT by placing a 1 in the space beside the item most in need of improvement, a 2 in the space beside the item next most in need of improvement, and so on through 5.

Please return the form to Rudy Dobesh, ATC-D by May 5th.

TECHNICIAN ASSISTANT

Information recording (notes/data) ____

Interact well with coworkers & supervisors (maintain good male/female relationship, reduce defensiveness) ____

Remember & follow instructions ____

Desire to learn and work ____

Basic literacy skills (reading, writing, math) ____

Planning own time ____

Listen well ____

BASIC TECHNICIAN

Safety ____

Problem solving ____

Initiative ____

Basic computer literacy ____

Basic statistical methods ____

Basic grammar & writing ____

Figure 10. Skills Ranking Form

(cont. on next page)

TECHNICIAN

Record keeping _____

Inter-Labs communications _____

Communicate observations orally _____

Basic problem solving _____

Time management (personal) _____

Information searching skills (library, reference material) _____

How to cut red tape _____

Willing to express ideas & question people regardless of job grade _____

Able to express ideas & question people regardless of job grade _____

SENIOR TECHNICIAN

Implement changes _____

Represent host organization to other companies or plants with host organization supervision (people skills)

Basic report/letter writing _____

Basic technical writing _____

Assign work to others (delegate) _____

Basic data interpretation _____

Logic/reasoning skills _____

Figure 10 (cont.)

(cont. on next page)

STAFF TECHNICIAN

Instruct individuals or crews ____

Freedom to act outside division ____

Handle personality differences effectively (people skills) ____

Recognize people problems (empathy) ____

Deal with different people and situations ____

Basic speaking skills (formal presentation) ____

Fundamentals of business operation ____

Intermediate data analysis ____

Control temper ____

PROJECT/PROCESS SUPERVISOR

Thorough understanding of project/process ____

Motivate others ____

Recognize interpersonal problems ____

Manage interpersonal problems ____

Bring out the best in people (leadership) ____

Conduct performance reviews ____

Make independent decisions ____

Be fair/decent/unbiased ____

Be sensitive to minority relations ____

Understand budgets ____

Be responsible for safety of others ____

Maintain proper attitude and self motivation ____

Figure 10 (cont.)

(cont. on next page)

SUPERVISOR

People skills ____

Implement policy changes ____

Totally understand the host organization system

Manage salaries and audits ____

Be able to cut red tape ____

Implement courses of study ____

Maintain proper attitude and self motivation ____

Communicate ____

Be responsible for inventory and budget items ____

Participate in division management policy and decisions ____

AREA SUPERVISOR

Training and direct supervisors ____

People skills ____

In-depth understanding of the host organization system

Resolve schedule and manpower conflicts ____

Leadership ____

Compile long term scheduling needs for equipment and manpower ____

Motivate others ____

Maintain proper attitude and self motivation ____

Be mentally tough ____

Implement changes in policy ____

Figure 10 (cont.)

(cont. on next page)

TECHNOLOGY SUPERVISOR

Act with total freedom _____

Maintain proper attitude _____

Complete understanding of division mission _____

People skills _____

In-depth understanding of the host organization system (administration, policy, etc.) _____

Project management skills _____

Technical writing ability _____

SENIOR STAFF TECHNICIAN

Technical writing skills _____

Ability to influence others _____

Conduct testing independently _____

Maintain proper attitude and self motivation _____

Oral speaking skills (formal) _____

Teach/train others _____

Purchase and assemble apparatus _____

Deal with people outside division _____

Ability to interpret/analyze data _____

Direct subordinates _____

Statistically design experiments _____

Operate effectively with limited supervision _____

Report to people in other companies about findings _____

Figure 10 (cont.)

(cont. on next page)

TECHNOLOGIST

Be aware of, and be able to assist in, budget process _____

Make fundamental changes in processes _____

Technical writing skills _____

Maintain proper attitude and self motivation _____

Be creative/innovative _____

Management knowledge (people) _____

Leadership characteristics _____

Formal speaking skills _____

In-depth understanding of the host organization system (administration, policy, etc.) _____

Teach/train others _____

Job review skills _____

Project management _____

SENIOR TECHNOLOGIST

Job review knowledge _____

Maintain proper attitude and self motivation _____

Counsel and advise less experienced scientists _____

Project development _____

Interplant activities _____

Coordinate on a broad area _____

Expert analysis _____

In-depth understanding of the host organization system (administration, policy, etc.) _____

Figure 10 (cont.)

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STAFF TECHNOLOGIST

Project management _____

In-depth understanding of the host organization system (administration, policy, etc.) _____

Effective people management _____

Train/teach/coach _____

Budget management _____

Maintain proper attitude and self motivation _____

Innovator _____

Figure 10 (cont.)

Appendix B

CODED TECHNICIAN NONTECHNICAL SKILLS

Table 2. Coded Technician Nontechnical Skills

Technician Assistant

1. Interacting well with coworkers and supervisors (including maintaining good male/female relations)	H
2. Basic literacy skills (reading, writing, math)	T
3. Listening skills	H
4. Clear interpersonal communication	H
5. Preparing notebook entries detailing day's activities	T
6. Interpreting job description and translating performance review into improvement	T
7. Observing safe working habits	T

Basic Technician

1. Observing safe working habits	T
2. Basic grammar and writing skills (organizing and writing simple reports)	H
3. Basic computer literacy	T
4. Fundamentals of problem solving	H
5. Record keeping	T
6. Personal planning	H
7. Clear interpersonal communication	H

Technician

1. Communicating observations orally	H
2. Basic problem solving	H
3. Record keeping (organizing data and records on permanent data sheets in addition to daily lab notebook)	T
4. Basic report writing (organizing and writing basic reports outlining procedures used and results obtained)	H
5. Effective listening skills	H
6. Time management (organizing and prioritizing)	H
7. Observing safe working habits	T

Senior Technician

1. Logic/reasoning skills	H
2. Basic data interpretation	T
3. Basic report/letter writing	H
4. Outlining, brainstorming, prioritizing	H
5. Interpersonal communication skills (informal oral presentation)	H
6. Basic technical writing	TH
7. Observing safe working habits	T

(cont. on next page)

Table 2 (cont.)

Staff Technician

1. Recognizing people problems (empathy)	H
2. Assertiveness	H
3. Decision making	H
4. Interpersonal skills (handling personality and situation differences)	H
5. Problem solving	H
6. Intermediate data analysis	T
7. Basic business skills	T
8. Promoting and observing safe working habits	HT

(Beginning of the Supervisor track)

Project/Process Supervisor

1. Interpersonal relations, dealing with other experts	H
2. Report writing/basic business correspondence	HC
3. Management skills Management by objectives Project management (including operating and capital budgets) Goal and objective setting	HT
4. Leadership/motivational skills	H
5. Strategies for creating and maintaining effective minority relationships (including male/female relationships)	H
6. Promoting safety awareness	HT

Supervisor

1. Performance review skills	H
2. Supervisory skills (motivating, coaching, delegating, managing conflict, career development)	C
3. Knowledge of host organization salary plans	C
4. Knowledge of the fundamentals of host organization job descriptions and evaluations	C
5. Planning and scheduling	HT
6. Understanding of host organization management styles and philosophies	C
7. Advanced oral and written communication skills (status reports, cover letters)	HT
8. EEO laws	TH
9. Providing a safe workplace and promoting safe working habits	HT

(cont. on next page)

Table 2 (cont.)

Area Supervisor

1. Advanced leadership skills	H
2. In-depth understanding of the host organization system (administration, policy, Labs mission and objectives, strategic direction as applied to Research and Development)	C
3. Establishing a safe working area and helping to implement safety programs	HT

Technology Supervisor

1. Technical writing	TH
2. Advanced project management skills	TH
3. Formal oral presentation skills	H
4. Consultation skills	H
5. Establishing a safe working area and helping to implement safety programs	HT

(Beginning of the Technologist Track)

Senior Staff Technician

1. Goal and objective setting	H
2. Planning and scheduling	HT
3. Interpreting/analyzing data	T
4. Strategies for creating and maintaining effective minority relationships (including male/female relationships)	H
5. Interpersonal skills	H
6. Leadership skills	H
7. Technical writing skills	TH
8. Formal oral presentation skills	H
9. Time management	H
10. Promoting safe working habits	HT

Technologist

1. Project management	HT
2. Technical writing	TH
3. Time management	H
4. Creativity	H
5. Advanced problem solving skills	H
6. Advanced logic/reasoning skills	H
7. Leadership skills (motivating, coaching, influencing, delegating)	H
8. Assisting in establishing a safe working environment and implementing safety programs	HT

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Table 2 (cont.)

Senior Technologist

1. Expert analysis/Consulting skills	H
2. Project development (initiation/identification)	TC
3. Understanding of the host organization's mission and objectives	C
4. Understanding of the corporate philosophy that drives Research and Development	C
5. In-depth understanding of the host organization system (administration, policy, business operation)	C
6. EEO laws	TH
7. Helping to provide a safe working environment	HT

Staff Technologist

1. Project management	HT
2. Innovation	HT
3. Effective people management	H
4. Train/teach/coach	H
5. Budget management	T
6. Promoting a safe working environment	HT